

### **REMARKS**

Claims 11-20 are currently pending in the application.

Claim 11 has been amended to clarify the claim language by adding the ink flows in order from the manifold to the auxiliary chamber to the primary chamber to the inkjet orifice and that there is a single inkjet orifice. Support for this amendment is found in at least the following locations within the specification: Figs. 1N, 3D, has two ink orifices, and paragraph 52. Claim 11 has also been amended to include a Ni alloy, support for this amendment is found in at least paragraph 48. Additionally, a typographical error was corrected (insulting was amended to read as insulating). Claim 16 was amended in order to correct a typographical error ("of" was amended to read --as or--). Accordingly, no new matter has been entered by way of these amendments. Entry of the Amendment is respectfully requested.

### **Rejections under 35 USC § 103**

The Examiner has rejected claims 11, 12, 14-17 and 20 under 35 USC § 103 (a) as being unpatentable over U.S. Patent No. 5,387,314 to Baughman et al. ("Baughman") in view of EP 317,171 to Leban ("Leban"), US Patent No. 5,831,648 to Mitani et al. ("Mitani"), US Patent No. to Taub ("Taub") and US Patent No. 6,214,245 to Hawkins ("Hawkins").

The Examiner argues that Baughman discloses a silicon substrate, an insulating material layer, a funnel shaped manifold, two spaced apart heaters, and a primary ink chamber and an auxiliary ink chamber. The Examiner acknowledges that Baughman fails to teach another insulating layer on top of the heater and insulating material layer, an insulating material layer of at least 1000 Å thick, a photoresist layer of at least 200 Å thick on top of another insulating layer, metal seed layer on the first photo resist layer, orifice formed in the metal layer, Ni layer on the top of metal seed layer with an aperture formed therein in fluid communication with the ink jet orifice, the heater in the primary chamber being ring-shaped and the seed layer being either Ni or Cr.

The Examiner contends that Leban teaches another insulating layer, a photoresist layer of at least 200 Å thick on top of another insulating layer, and a nickel orifice plate. The Examiner

also contends that it would have been obvious to have an insulating layer to protect the underlying heat resistor.

Regarding Mitani, the Examiner argues that Mitani discloses an ink jet print head comprising a silicon substrate and a silicon dioxide insulation layer formed between the substrate and a heater. The Examiner continues that it would have been obvious to have provided Baughman with a silicon insulating layer based on the teaching of Mitani.

With respect to Hawkins, the Examiner argues that Hawkins teaches a method of forming an orifice plate for an ink jet print head wherein a seed layer is formed over the substrate and then a plate layer of Ni is formed over the seed layer. The Examiner concludes that this would have been obvious to use this to make a very small nozzle plate. Applicants strenuously, but respectfully traverse the rejection and the arguments in support thereof.

Even if Baughman was modified in view of Leban, Mitani, Taub, and Hawkins, the modified Baughman inkjet head would not disclose each and every element of claim 11. Claim 11 recites a single inkjet orifice formed in the metal seed layer, with the inkjet orifice being positioned on the first side of said manifold such that ink flows in order from said manifold, to said auxiliary chamber, to said primary chamber, and to said inkjet orifice. Baughman teaches two orifices 20 with two primary chambers, and does not disclose an auxiliary chamber, as suggested by the Examiner (*See* Fig. 1), because a primary chamber is associated with a nozzle and an auxiliary chamber does not have a nozzle, which is why it is termed as being “auxiliary.”

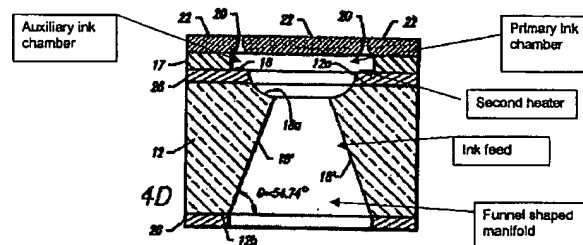


Fig. 1: Figure from Office Action

In the Examiner’s annotated figure, the “auxiliary ink chamber” is aligned with a nozzle, which is incorrect because if it is aligned with a nozzle it cannot be an auxiliary ink chamber. The inkjet in Baughman has two nozzles and therefore, two primary chambers and no auxiliary chambers. The present invention, on the other hand, has two ink chambers and two heaters for one nozzle. Even if the chamber of Baughman that the Examiner identifies as the “auxiliary

chamber” is an auxiliary chamber, the ink does not flow from the “auxiliary chamber” to the primary chamber on the other side of the manifold and then to the nozzle, as in the present invention. Instead, the ink flows to the nozzle on the same side as the “auxiliary chamber.”

Also, the modified Baughman inkjet head does not disclose a heater being part of an auxiliary chamber or two spaced apart heaters – one of them on the first side of the manifold and one of them on the second side, where the auxiliary ink chamber is, as set forth in claim 11.

Baughman is the same as the other conventional references, i.e. one heater for each nozzle. This is different from the present invention because the present invention has two heaters (one in each ink chamber) for one nozzle.

Additionally, the references are improperly combined. Baughman discloses two distinct heaters, one on each side of the manifold with no insulation. Mitani, on the other hand, discloses a single heater that extends the length of the apparatus along with an insulating layer that extends the length of the apparatus. There is no motivation within either reference to include an insulating layer of 1000 Å in the present invention on the top surface of the substrate when there are two localized heaters. Especially since Mitani uses insulation that is 10,000 to 20,000 Å thick. The thickness in Mitani is an appreciable difference from Baughman which uses 1000 Å – in fact the difference is an entire order of magnitude. It would not be obvious to one skilled in the art to reduce the insulating layer by an order of magnitude and achieve the same result.

Having an auxiliary ink chamber with a heater enhances the refill speed. Unlike the present invention, Baughman has one heater for each nozzle, whereas in the present invention there is a heater disposed on the second side of the manifold along with the auxiliary ink chamber.

Regarding claim 15, the teachings of the references, particularly Mitani and Leban, are contradictory. Leban discloses a heater constructed of TaAl. (*See Leban*, p 3, ln 41-53) However, Mitani discloses tantalum and aluminum, but not combinations or compounds of the two together. Additionally, Mitani states “Nickel is thus determined as the most suitable material as the thin-film conductor for the heater resistor.” (*See Mitani col 9, ln 60-61*) The balance of the references do not mention the material of the heater. Therefore, one of ordinary skill in the art would not be inclined to combine Leban and Mitani, especially with respect to heater element compositions.

Accordingly, not all of the elements of the present invention are taught by the references, either individually or in combination. Therefore, Leban, Mitani, Taub and Hawkins fail to make up for the deficiencies of Baughman.

Claims 12, 14-17 and 20 are allowable, since they are either directly or indirectly dependent claim 11, which is allowable as argued above.

Accordingly, it is respectfully requested that the rejection of claims 11, 12, 14-17 and 20 be reconsidered and withdrawn.

The Examiner has rejected claims 13, 18 and 19 under 35 USC § 103 (a) as being unpatentable over Baughman in view of Leban, Mitani, Taub, and Hawkins as applied above and further in view of US Patent Application 2002/0012027 to Moon.

Since claims 13, 18 and 19 depend from an claim 11, either directly or indirectly, as argued above, they are also allowable. Accordingly, it is respectfully requested that the rejection of claims 13, 18, and 19 be withdrawn.

**CONCLUSION**

In view of the above amendments and remarks, it is submitted that the claims patentably distinguish over the art of record and known to applicants. Reconsideration and a Notice of Allowance are respectfully requested.

Respectfully submitted,

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